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ABSTRACT

This state-of-the-art paper, first in a series, provides teachers and other educational decision makers with analytical and critical information about the use of simulation/games in social studies classrooms in order to promote and improve the use of this innovative educational technique. Discussed are non-computer, commercially available simulations and simulation/games intended for use at grades five through twelve. The following are included: (1) an intensive review of the theoretical and research literature on gaming and simulation; (2) an analysis of patterns of integration of simulation/games within several new social studies projects; (3) a critical evaluation of many free-standing simulation/games; and (4) an analytical framework for examining various simulation-type activities. (Author/RM)

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SIMULATION/GAMES IN SOCIAL STUDIES: WHAT DO WE KNOW?

By

Katherine Chapman, James E. Davis,
and Andrea Meier

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PREFACE

The work reported in this manuscript was conducted during 1972-73 by the ERIC Clearinghouse for Social Studies/Social Science Education under U.S. Office of Education Grant No. OEC-0-70-3862, "Integrating Simulation/Games into Social Studies Curricula: An Analysis." The work is intended to provide teachers and other educational decision makers with analytical and critical information about the use of simulation/games in social studies classrooms in order to promote and improve the use of this innovative educational technique. The project considered only non-computer, commercially available simulations and simulation/games intended for use at grades five through 12.

Simulations and simulation/games have become highly visible in classrooms in the past six to seven years, and a major proportion of these have been developed for use in social studies classrooms. Simulation-type activities are especially appropriate vehicles for social learnings. They stimulate active learner involvement and encourage realistic consideration of social issues. Thus, they can be a particularly powerful technique in the social studies classroom. Currently, however, there is a lack of analytical and evaluative information on the strengths and weaknesses of simulation/games, and what information there is often is confusing or not readily available to educational decision makers.

To meet the broad objective stated above, the project proceeded on two fronts. First, an intensive review of the theoretical and research literature on gaming and simulations was conducted. This review included an analysis of patterns of integration of simulation/games within several new social studies projects as well as a critical evaluation of many free-standing simulation/games. This background served as the basis for developing an analytical framework for examining various simulation-type activities (role-plays, simulation exercises, games, and simulation/games). All of this work is reported in this, the first paper in this ERIC/ChESS series.

A second project endeavor was to develop and try out a set of guidelines for maximizing use of a simulation/game in the classroom. These guidelines provided general guidance on how to prepare for, handle,

and debrief any simulation/game. The development of, teacher reactions to, and revised version of these guidelines is reported in the second paper of the series, *Guidelines for Using a Social Simulation/Game*.

A third part of the project was to make a survey of the use of simulation/games by social studies teachers. One hundred and thirteen teachers from eight states completed a variety of written reports on goals, learning outcomes, and general conditions under which simulation/games are used. A considerable amount of anecdotal information and some student-created products were included in the reporting. The major part of the information garnered from this survey is reported in the third paper of the series, *Simulation/Games in Social Studies: A Report*.

Katherine Chapman
James E. Davis
Co-Directors
August 1973

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The late Robert S. Fox, as Director of ERIC/ChESS, helped us throughout the preparation of the paper with thoughtful comments and suggestions. Jack Cousins and Richard Van Scotter offered helpful criticism. Editorial responsibility, a difficult task when three authors prepare a paper, was ably carried out by Karen Wiley, Chris Ahrens, and Sharryl Hawke. Finally, we appreciate the excellent typing and production job done by Nancy Dille.

--K. C., J. E. D., and A. M.

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SIMULATION/GAMES IN SOCIAL STUDIES: WHAT DO WE KNOW?

by

Katherine Chapman,
James E. Davis,
Andrea Meier

Introduction

In the past five to seven years many persons and groups have undertaken the development of role-plays, simulations, simulation/games, and other games aimed at enhancing learning. In large part these learning activities have been developed for use in social studies classrooms. Among the claims made for such simulation-type activities are that they (1) relate directly to the interests of students; (2) focus on the real social world; (3) involve the student directly and actively in the learning process; and (4) facilitate student organization of experience. Interestingly, these claims parallel four of the basic guidelines set forth in the *Social Studies Curriculum Guidelines* recently published by the National Council for the Social Studies. (See *Social Education*, Dec. 1971, pp. 860-866.)

Purpose of the Paper

A substantial body of literature has emerged the past few years in the area of simulation-type activities. That literature is diffuse and varied. Included are textbooks, research reports, journal articles, newsletters, and curriculum materials guides, as well as the many hundreds of simulation-type activities themselves. The content of this literature ranges from profound thoughts on the educational philosophy underlying the use of simulation-type activities in the curriculum to tips on how to use a game in the classroom. In developing this paper we defined our task as analyzing and synthesizing this literature, as well as interpreting the range of content presented.

Uses of the Paper

Because of the scope of the topic and the potential to use parts

of the manuscript in several different contexts, this paper is directed to a variety of readers. First, we are hopeful that those engaged in teacher training will find the information contained herein useful for both themselves and their students who want more than a superficial insight into simulation-type activities. Second, those engaged in curriculum planning, change, and development should profit from our investigation, as it sheds light on the nature of simulation-type activities as teaching/learning techniques and how they relate to educational goals. Third, those engaged in research in the field should find our extensive review of the research to date helpful. Fourth, practicing teachers who want more insight into simulation-type techniques could benefit from this paper, deriving guidance on effective incorporation of such activities into their curriculum plans. Although we have drawn heavily from the literature in social studies simulation and gaming, we feel that professionals throughout the educational community in any subject-matter area will find this publication useful. In fact, as the song puts it, we hope readers will find "something familiar, something peculiar, something for ev'ryone . . ."

Structure of the Paper

The introduction of any new area in education brings about a new language. For example, those on the "inside" use the terms "game" and "simulation" to mean two entirely different things. As one wag put it, "As a teacher you use the term 'game' with students; you use the term 'simulation' with administrators." In this manuscript's first section, "What Does It All Mean: Definition of Terms," we discuss the origins and problems of definitions surrounding simulation-type activities. Also, we present a discussion of the current usage of these terms in education.

Some have claimed that practitioners in education are currently "about where medical practitioners were in the early 1900s--just beginning to do more good than harm." We are not sure of the validity of this statement, but we are certainly aware that many in education are voicing dissatisfaction. Some who make accusations about what is wrong with current teaching methodology are offering a series of arguments favoring the use of simulation-type activities in the classroom. In some cases, the claims for successful use include some penetrating philosophical underpinnings. In the second section, "What's All the Fuss? The Claims

Made for Simulation Games," we cite many of the current dissatisfactions with education, set forth the claims supporting the use for simulation-type activities, and offer an outline of the philosophical underpinnings that are consistent with the use of simulation-type activities in education.

We are often asked what the research says about the use of simulation-type activities. In the third section, "What Do We Know? The Research Findings," we present a review of much of the research literature currently available in the field. This review includes research on the use of simulation-type activities with different learner groups in different settings, the use of different kinds of simulation-type activities, the variety of student and teacher learning outcomes (both cognitive and affective), problems of research design, and actual classroom use of simulation-type activities. In the last part of the section we summarize the state of the art in simulation research and cite a number of recommendations concerning further research.

All too often those engaged in "heavy duty" academic work are accused of offering the reader nothing practical. The accusers say, "Well, that's just fine, you really know your stuff, but what does it mean for me." In the fourth section, "Incorporating Simulation/Games into Curriculum Plans," we offer a number of ideas for the curriculum developer who wishes to include simulation-type activities in her/his curriculum. Our analysis is based on a review of the literature in the field, a thorough analysis of successful curriculum plans that include simulation-type activities, and the analysis of approximately 100 simulation-type activities that could be included in curriculum plans. We offer a number of observations, with examples, that should be helpful in thinking about placement and use of simulation-type activities in curriculum plans. In addition, we present a framework that will be helpful in analyzing simulation-type activities. By using the framework, a potential user of a simulation, game, etc., should be able to match the appropriate kind of activity with his/her projected learning outcomes. In addition, the framework can be used as a tool to help judge whether the design of any given simulation-type activity will tend to enhance or detract from its own stated

learning outcomes.

What Does It All Mean? Definition of Terms

Introduction

The meaning of a word derives from two sources. The first is that which the originator intended when the word was coined. The second source is the acquired meaning evolving from the adaptation of a word to a wide spectrum of circumstances. If a word happens to find public favor, as "game" has, it is likely to be applied in rather unexpected places and acquire meanings tangential to the original usage.

Eric Berne, in *Games People Play*, applied the term "game" to sequences of implicitly ritualized social interactions between people who have psychological goals. (Berne 1967) Garry R. Shirts counted 34 times in which "game" was used on the opening night of the 1972 Democratic convention, all having some reference to the supposedly serious business of government.* At present, in educational circles, the terms "educational game," "simulation game," "educational simulation," and "game" often are used interchangeably. In some cases, the choice of term is more determined by the politics of the situation than by a basic understanding of definitions. (Nesbitt 1971, p. 10) As mentioned in the Introduction, a teacher may use "simulation" to impress a superior with the seriousness of her/his intent and "game" with students to present the experience as enjoyable and non-threatening. (Sometimes this second approach has unexpected drawbacks. In personal conversation, some teachers report their sense of professionalism is threatened by students coming in day after day asking to play games again.)

Since meaning does get altered as a word filters into new areas of thought, it is not surprising that "game" and "simulation," as well, should shift in meaning as they are applied within the education system. In this section, we discuss both the original usage and evolved meanings (from the field of social studies education) of "game"

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*Private conversation, July 10, 1972.

and "simulation," as well as of "role-play," a concept strongly linked to the former two in educational practice.

Games and Role-Plays

As pure forms, neither games nor role-plays were designed for teaching purposes. The simplest kinds of games (sports contests, for example) and role-plays (masked balls, for example) were principally recreational, whether engaged in by adults or children. Charades is a venerable role-playing game, and some religious rituals and ceremonies--although clearly with serious intent--also could be termed role-plays. Boocock, drawing on George Simmel, points out an interesting common educational potential in that both games and role-plays provide an element of practice by staging an environment that mirrors "important real-life situations or problems, so that in playing . . . a person can in some sense 'practice' real life--without having to pay real life consequences of his actions." (Boocock, in Boocock and Schild 1968, p. 55) In their original forms, however, games and role-plays were enjoyed for their fantasy and contributed to social cohesion.

Another common characteristic is that both games and role-plays are relatively simple. In games, for example, all players have essentially the same choices of action. It is the combination and sequence of those choices which creates different strategies, as is clearly seen in a game like chess. Role-playing, on the other hand, usually involves dramatization of a single incident, or events with a single focus, such as children "playing house," in order to better understand the emotional repercussions of the "single-minded" interaction.

Games. Games and role-plays have different structures, of course, and their outcomes differ significantly. Huizinga composed this lyrical introduction to games, describing a game as "a voluntary activity . . . executed within fixed limits of time and place, according to rules freely accepted but absolutely binding, having its aim in itself and accompanied by a feeling of tension, joy and a consciousness that it is 'different' from 'ordinary life.'" (Huizinga 1955, p. 28) Abt elaborated, albeit more dryly: "A game may be defined as any contest (play) among adversaries (players) operating under constraints (rules) for an objective (winning a victory or

payoff). Mathematical game theory defines games in terms of the number of independent players, the degree of competition and cooperation among them, the amount of information they have about their adversaries and whether the game is deterministic or probabilistic . . . Whether games are defined as contests played according to rules with power resources, skill and luck, or as mathematical exercises, they always have the characteristics of *reciprocal actions and reactions among at least partly independent entities having different objectives.*" (Abt, in Boocock and Schild 1968, pp. 66-67)

Although neither Huizinga nor Abt specifically state it, goal orientation and competitivenesss imply self-interested behavior. Players may cooperate with each other in games, but this is more often motivated out of selfishness to maximize personal (or team) gain than through a global sense of unity. (Zaltman, in Inbar and Stoll 1972, p. 127)

In the sort of games considered for use in schools, most of the activity comes under the rubric of "formal game behavior" in that the behavior is the direct result of explicit rules. This behavior, therefore, is highly predictable. Cheating and most negotiating come under the heading of "informal game behavior" because, although such behavior is in response to formal rules, it is not strictly determined by the rules. In contrast, since the "rules" for the psychological games described by Berne are not explicit, these "games" elicit informal game behavior. That is, a participant normally cannot clearly define why he or she chose a particular response but still feels she/he acted with a sense of appropriateness. (Berne 1967)

Role-Plays. Shaftel and Shaftel, in *Role-Playing for Social Values*, describe role-playing as "the spontaneous practice of roles--assuming them in order to practice the behavior required in various cultural situations." (Shaftel and Shaftel 1967, p. 83) This is an educationally oriented definition since it imples more self-consciousness than might be expected in a child acting out his fantasies for fun, while it fails to include the use of role-playing in other situations such as therapy. Social studies educators often discuss origins and evolution in writing about games, but they seldom hark back to origins when discussing role-playing; the literature about role-playing concerns itself more with current applications.

In typical classroom use, a role-play is staged by a few students while the others watch; all students are included in the follow-up analysis and search for alternative behaviors. In contrast, everyone plays an active part in a game or simulation (except perhaps the "banker" and/or coach).

When role-playing is used for sociodrama and psychodrama, it is a structured event, although the acting out by participants normally will demonstrate informal game behavior à la Berne. The Shaftels describe the more desirable classroom use of role-play "as an elaborate social-learning method, and as a basic decision-making skill in the social studies program. Role-playing is a group problem-solving method involving a variety of techniques--discussion, problem analysis and definition through (1) initial enactment of proposals (taking on of roles), (2) observer reactions to the enactments (discussion), (3) exploration of alternatives through further enactments and discussion, and often (4) the drawing of conclusions or generalizations and decision-making." (Shaftel and Shaftel 1967, pp. 83-84)

For example, several students may be assigned roles as community members serving on a planning board that must consider and decide where a new highway is to run through town. In a well designed role-play, each "board member" will be told who he/she is, what her/his personal preferences and dislikes are in regard to location of the highway, and, in some cases, how much social and/or political power he/she has to affect the decision. The "board" will, in all probability, stage its meeting before the rest of the class; the class may even take the role of community members at a public hearing.

In the role-playing experience, actors must discover the dimensions of the conflict for themselves and resolve it in ways that are congruent with their informal rules and emotional needs. Instead of having interaction based on a clearly defined conflict and on formal strategies, as in games, role-playing is designed to encourage actors (and observers to a lesser extent) to gain in empathy through emotional responsiveness to complex situations.

Simulations

Although both a role-play and a game require human participants,

a simulation may be completely contained as a set of data and directions in equation form for a computer. A program based on Monte Carlo methods and run through a computer in order to determine the best production possibilities for a firm is a simulation of that firm in operation. In its purest sense, simulation is a technique for constructing a working model of a real-life process, so that the real-life phenomenon is replicated with reasonable accuracy. "Simulations designed for operation by computers differ drastically in technical apparatus and appearance from those designed for human actors . . . [However,] simulating a process is basically the same intellectual problem, independent of the means used. Indeed, theoretically all modes serve the same purpose; the same problems of interpretation apply; and the principles of design are similar." (Inbar and Stoll 1972, p. 14)

The two most important features of a simulation are (1) its correspondence to the selected real-world phenomenon which makes up its subject and (2) its holistic nature, i.e., its ability to incorporate and represent the interrelationships and interdependencies operating in the real-world phenomenon that it simulates.

In general, simulations are more complex than games because they include a number of interacting subsystems, the individual operations of which may be quite different from one another. One result of these internal differences is that goal orientations and standards of performance for participants in human-actor simulations diverge and often conflict. A good example of this is seen in the popular simulation, Dangerous Parallel,* in which teams of players represent various ministers for six different countries. The ministers from each country work together to set goals and choose actions which will forward their own country's interests while avoiding all-out war in the international crisis around which the simulation is built. In this simulation, each country represents a subsystem which must do its best to maintain internal efficiency as well as interact successfully with the five subsystems (countries).

In a human-actor simulation, correspondence to the real world is based on role definitions, resource allocation, and rules. In such

*A listing of all simulations and simulation/games cited in the text will be found in the Appendix.

simulations it is important that playing behavior and game outcomes correspond to real-life behavior as closely as possible.

There are two basic parts to any simulation--structure and process. The structure of a decision-making system is simulated by first defining certain roles, then assigning them goal orientations and resources. Process is simulated by rules which (1) put physical, normative, and legal constraints on behavior--constraints analogous to those in real life--and (2) make interactions operate smoothly.

Within the second category of rules, there are environmental response rules and rules governing procedure. "Environmental response rules* specify how the environment would behave if it were part of the simulation. These rules are particularly important because they encompass the probable response of that part of the environment that is not incorporated into the actions of the players . . . environmental response rules generate variations in resources, constraints and goals deemed to increase the fit between the process as it occurs in the artificial and in the actual environment." (Inbar and Stoll 1972, pp. 17-18)

Procedural rules serve several functions. Some describe how the system is put in motion; others guide the general order of activity.

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*An example of an "environmental response rule" from Ghetto may clarify this technical term: In each round, players invest their hour chips in various ways: school, hustling, welfare, relaxation, or work. After investing, the system rewards or punishes the players for the way they used their time resources. Rewards and punishments come in the form of chance cards. The chance cards represent the relatively poor quality of ghetto schooling, the unsatisfying nature of the majority of jobs available, and the various rewards and risks of being a hustler. The changes in resources of each player awarded through the vehicle of the chance cards are intended to represent the response of the environment to the players investments of their time.

The environmental response rules portrayed through the chance card mechanism is strictly arbitrary and predetermined by the game makers. But a second variety of environmental response rules can allow players themselves to shape an environment of significance during the game. For instance, in Ghetto, players can improve neighborhood conditions by investing time in that area. As conditions improve, the chances decrease that crime will continue to pay lucratively, and more hustlers go to jail. (See pp. 7-12 in Ghetto Teacher's Guide.)

For example, many things may be going on at once, and some procedural rules keep the system from collapsing in the chaos of simultaneous behaviors. Yet another type of procedural rule divides periods of multi-directional activity into "rounds" to create an illusion of chronological progress within the microcosm. (It is characteristic of simulations that they reduce the time element--along with other elements--in the operating system, thus allowing long-range effects of decisions to become visible.)

Educational simulations vary considerably in the amount of freedom participants have to engage in informal game behavior. However, most educational simulations allow for a mix of formal and informal game behavior.

Simulations in Education

Research-oriented simulations are designed with the intermediate goal of manipulating data and the end result of formulating theory. Such simulations assume a good deal of background knowledge in the users and tend to encourage inductive learning. Instructional Simulations, Inc., headed by Ronald G. Klietsch, refers to those used for research simply as "simulations" and calls those used for teaching/learning purposes "educational simulations." (*Simulation in Perspective . . .* 1970) In a general sense, a simulation may be called "educational" if it can be and is used in a pedagogical context and was designed with specific learning objectives in mind. Dangerous Parallel, described previously, is an "educational simulation." Its main learning objective is to enable students to experience the role of international decision-maker from defining goals, to taking action, to analyzing consequences of decision.

Klietsch *et al.* also make a distinction regarding "learning games," examples of which are Wff 'n Proof (which teaches logic) and Equations (which teaches logic and mathematics). Learning games "do not typically involve scenarios, recreated environments, roles, or playing at roles, but do create a fantasy of environment based on participant interaction, strategy, predicaments, and opportunities." (Klietsch, Wiegman, and Powell 1969, p. 5) This is a useful distinction, but it is not adhered to in general practice.

The terms "simulation-game" and "educational-game" sometimes are loosely and interchangeably used to refer to somewhat simplified versions of pure simulation. Abt divides this educational-simulation-game group, saying, "there are two basic types: a) 'gamey games' of the more traditional type, typified by a good bit of 'hardware' (cards, gameboards, spinners, etc.), and b) role-play simulations, more on the order of plays without scripts." Abt continues: "the first type (a) lends itself easily to quantifiable subject matter such as math, science, language. The second type (b) is particularly appropriate where qualitative factors are paramount, in social studies, for example. The first type emphasizes manipulation of concrete variables, while the second emphasizes 'human factors' like: persuasion, power, communication, resource control, planning and forecasting, community decision-making, strategy trade-offs, and 'psyching out' actions of others." (Abt 1971, p. 2) Thus, most educational simulations appropriate to social studies would be of the role-playing type.

Even within role-play simulations, there is a continuum from more "gamey" to more role-play-based simulations. Those simulations dealing with social or political power and/or with economic variables generally use more hardware and chance factors and less role-playing than others, possibly because they must include more non-human environmental responses than the others.

As Fletcher has pointed out, whatever this new form of classroom activity has been called--game, simulation, educational simulation, simulation/game, or educational game--it has been created from several major elements:

1. There is a set of two or more players (or teams).
2. A set of rules provides choices of behavior for the players (teams).
3. A set of possible outcomes (payoffs or goals) is specified or determinable.
4. There is a conflict of interest among the players (teams) over goals or the selection of strategies.
5. Each player (team) has a certain capacity to act (a set of resources) and a pattern of preferences

among the goals.

6. There is an information system. (Fletcher 1971b, pp. 429-430)

Most simulations that use human actors--and this includes most educational simulations--are actually hybrids of simulation and game because the rules establish "a conflict of interest" among "adversaries." Therefore, the authors of this paper prefer to use the term "simulation/game" as the most accurate and representative of those activities now taking place in social studies classrooms that incorporate some degree of simulation.

There may be great differences in the scenarios, types of interactions allowed, and the mix of luck (chance) versus skill involved, all of which have some bearing on how "educational" the activity really is. Further, the degree to which a critical event created in the activity replicates some portion of reality may be used as a criterion to judge whether the activity can be honestly termed a simulation.

Livingston, in an article called "Six Ways to Design a Bad Simulation Game," points out (by inference) what one should do to construct a good "social simulation game" that has as its purpose "to increase the players' understanding of the behavior of people in the situation simulated," a category including most simulation/games likely to be used in social studies classrooms.

1) Be sure the game description and rules "reproduce the incentives that guide the behavior of people in the real situation," define "what resources each person has that he can use to influence the actions of the others," and provide an objective standard by which players can judge the quality of their decisions.

2) Construct a model on which to base the game.

3) Have the players spend most of their time doing things that are central to the concerns of the real people that players represent.

4) Have all players centrally involved in making decision.

5) Have chance play a minor role, if there is a chance factor at all.

6) Narrow the model to encompass only a manageable amount of reality; gear both model and rules to the players' level of competence. (Livingston 1973)

What's All the Fuss? The Claims Made for Simulation/Games

Dissatisfaction with the Schools

The present enthusiasm for games seems, to some extent, to spring from a general dissatisfaction with schools which are seen as failing to reach their stated goals or even focusing on the "wrong" goals. Proponents of simulation/gaming cite several aspects of the prevailing social organization of schools and of prevailing educational methods as interfering with stated or desirable educational goals.

Boocock and Coleman effectively describe some of the common complaints. (Boocock and Coleman 1966, pp. 216-218) Typical of most classrooms in the past and many in the present, they point out, is a situation in which one teacher tries to manage a large group of students. The teacher has two well defined roles: conveyor of information and values and judge-evaluator of how well students assimilate what is taught. The teacher may resort to the simplest method of coping with a large group: lecturing, assigning readings from textbooks, holding discussions on them, giving tests, and assigning a few research projects.

A "hard-working" classroom is often defined as one in which quiet reigns and students pursue their goals separately. This situation generally runs counter to students' needs to interact with each other, and stimulates such "illegitimate" behavior as note passing and whispering. One basic assumption of this superimposed order is that interaction among students does not produce significant learning. To the student, however, the social life of the school is important--maybe the most important thing happening there--so he turns his resentment and hostility on the teacher who intervenes.

Charges are also made that curriculum and teaching methods are irrelevant, superficial, and out of date. This can be partially explained by the high cost of replacing curriculum materials. However, the psychological cost of changing the basic social organization of the schools to be responsive to new teaching methods is even higher. The prospect of such a change often is met with outright hostility.

The assignment system tends to produce learning for the sake of

survival rather than for its own sake. Skills are taught primarily as tasks which have a range of acceptable performance. There is little encouragement for inner-motivated excellence because standard requirements make students learn an "assignment."

Many people are becoming aware that the world does not always operate in a distinct and linear fashion--it's operation is often more like the unpredictable mélange of a light show. In spite of this, knowledge often is divided, like Gaul, into subject areas--separate, distinct, and absolute. The idea of Spaceship Earth as a closed system comprised of many simultaneously operating subsystems was transmitted by television, not by the schools. The teacher's authority, combined with the predeterminism of textbooks, often obscures the reality of how much is yet unknown and how many theories are still open to question. The obscurity deepens when the student is asked only to regurgitate theories and not to test them or to identify and evaluate their underlying assumptions.

Claims Made About Simulation/Games

Many claims made for simulation/games (as well as for many other techniques employed by the "new social studies"), though still unsubstantiated by research, are directed toward the complaints enumerated above.

For example, it is widely believed that simulation/games are very good motivators. There are several factors that apparently contribute to this effect. The idea that it is "only a game" allows players to perceive it as an enjoyable, non-threatening activity. The elements of competition and chance provide a modicum of suspense about the outcome. The challenge of competition may suit the needs of adolescents, especially, to take risks. Yet competition is combined with the advantage that players are secure from the consequences of their acts in the real world. Interaction between students is legitimate, resulting in a self-disciplining structure which arises internally from the need to obey rules if the game is to continue. (Boocock and Coleman 1966, p. 219) And, to the extent a player identifies with a rule, this "personal" involvement draws him into paying more attention to the problem at hand. (Sachs 1970, p. 163)

Simulation/games require the use of--and hence promote development

of--relational reasoning and decision making. They also provide rapid feedback. The player uses the information and resources at her/his disposal to make decisions during the game and is able to observe repercussions within a short time. Thus, it is claimed that the simulation experiences provide him/her with a more variegated, more complex, and more integrated world view than is provided by most other educational methods. Further, in simulation/games the future is often brought into the present. All of this makes learning relevant, meaningful, and timely. In addition, the very form of a simulation/game immerses the player in a value system that can be confronted and analyzed. (Washburn 1972, pp. 102-103)

It is also claimed that the teacher may step into a more productive role. Since simulation/games are designed to be self-judging--in that the rules provide the standard for comparing performance--and self-disciplining, the teacher is removed from those judgmental and critical duties that make her/him a threat. This allows a teacher to shift to a role of helper and coach--to a non-threatening role as co-director, so to speak, of interaction between game and students, helping students to heighten awareness of their own experiences.

Educational Philosophy Underlying Simulation/Gaming

The dissatisfactions with schools enumerated above indicate a certain philosophy of education. Simulation-gaming did not arise from, nor does it pretend to represent, a full-blown philosophy of education. Rather, it seems to be most heartily taken up by those already holding to a philosophy that emphasizes certain aspects of teaching-learning that are believed to be incorporated in simulation/games.

This educational philosophy emphasizes that knowledge is dynamic (not fixed) and interrelated and that understanding dynamics and interrelationships is what is important. For instance, students should develop a sense about what they--and others--do not know as well as about what is known. That is, they should develop a healthy skepticism regarding "truth" and "proof," recognizing these to be man-made and human-oriented--and heir to human fallibility. Knowledge is created out of personal experience, both individual and shared. Students learn from one another and from the synergistic outcomes of the group.

The discipline for learning comes from the learner's submission to the process of learning, rather than from an externally imposed authority such as a teacher. The learning process is composed of such activities as asking, experimenting, decision-making, and experiencing consequences of decisions made--all processes of active involvement. In such a learning climate, the teacher acts as a facilitator, rather than as judge and critic.

These concerns seem to be most closely aligned with models of teaching based on an attempt to create "democracy-in-action" in the classroom. (Chapman 1973) Those holding to such models believe that "the essence of democratic process is the creation of interaction among the unique, personal worlds of individuals so that a shared reality is created. This shared reality should embrace the unique personal worlds and encourage their growth while providing for common investigation, growth, and governance." (Joyce and Weil 1972, p. 34)

Despite the present visibility of simulation/games in social studies, their use seems to be confined to a small percentage of classrooms. It has been suggested that the main reason for this lies in the conflict between the educational philosophy underlying simulation/games and the educational philosophy held by many, if not most, teachers and administrators. A teacher who perceives him/herself as the fount of all wisdom will not believe students can create wisdom/knowledge out of their interactions with one another. Educators who find the philosophy implicit in gaming unacceptable will resist the new technique. (Heyman 1973, p. 6)

What Do We Know? The Research Findings

Introduction

As simulation/games have penetrated into social studies classrooms, greeted either by relieved cheers or suspicious glares, theorists and researchers have begun to investigate the effectiveness of this new educational technique. After studying present research, some observers have concluded that (1) simulation/gaming generates more enthusiasm among students than more traditional educational methods and (2) students learn no more "content" from a simulation/game than from other educational methods. There is, however, some work in existence that calls both of

these conclusions into question.

Simulation/gaming research has been conducted with a variety of populations. Although much research has involved high school students, populations have ranged from third-grade students to adults; some young participants in non-school situations have also been included. Most work has been done with normal classroom populations, but there are studies demonstrating that simulation/gaming is effective with underachieving boys (Farran, in Boocock and Schild 1968, pp. 191-203) and with high ability underachievers and blacks (Varenhorst, in Boocock and Schild 1968, pp. 251-254).

Research studies have used many different simulation/games, most utilizing human actors only. However, Wing found that sixth graders could use and enjoy playing Sierra Leone and the Sumerian Game which involve the individual with a computer terminal. (Wing, in Boocock and Schild 1968, pp. 155-165) Business games usually are man-computer games. A substantial portion of the research reported in this paper was done by people affiliated with the Johns Hopkins game project (part of the Center for Social Organization of Schools), the only group continuously conducting research on educational simulation/games. (Livingston and Fennessey 1973) They used games developed by that project (e.g., Democracy, Ghetto, Generation Gap), so that, in a few cases, more than one study has been based on a single game.

The use of different simulation/games (encompassing differences in subject matter, sophistication, number of players, size of teams, types of interaction, etc.) and the use of diverse populations make few of the current research findings generalizable. We do not know for certain which of the differences are important and which are not. For example, some findings based on adult groups appear on the surface not to be applicable to children, and vice versa.

In addition, it has been suggested that games with different structures may have built-in differences in learning outcomes. (Theony and Horton 1970, p. 15) If this is so, comparison of learning outcomes from games with different structures would be wasted motion. There also are charges that many games currently in use, presumably including some used in reported research, are so poorly designed as to negate research findings based on their use. That is, the results

have no relationship to the results possible from use of a properly designed game. Many simulation/games simply do not "work as games"; the rules have gaps and contradictions and/or do not provide for contingencies that might arise during play. (Fletcher 1971b, p. 425) Also, many are designed with no relationship between the game structure and the intended learning outcomes. (Fletcher 1971b, p. 426; Twelker 1972, p. 151)

The literature on gaming shows that the games used in many studies were not standardized in a way which allowed replication of the research. (The Johns Hopkins group is making efforts to remedy this situation.) Each study tended to use its own battery of tests; such tests were often limited by inadequate testing procedures and unsophisticated statistical analysis. (Wentworth and Lewis 1973, p. 438)

The reports that follow are nearly all based on "one-shot" research studies. Thus, for the several reasons given above, one must generalize from the research findings very cautiously. The generalizations stated below are ventured tentatively and should be used warily.

This discussion of research findings is presented in four parts. The first describes research dealing with what is learned; the second concerns variables which affect learning outcomes from simulation/games; the third part discusses research on how to use a simulation/game; and the fourth describes what little research has been done in other areas *vis-a-vis* simulation/gaming.

What Is Learned?

One of the first questions practitioners ask is, "Do simulation/games teach content better than conventional methods?" In an early study, Baker found that high school classes using an historical simulation performed significantly better on a posttest than did classes using a standard approach. (Eugene Baker, in Boocock and Schild 1968, pp. 135-142) However, most studies of this sort show only occasionally better results for subjects using the simulation/game (Wing, in Boocock and Schild 1968, pp. 155-165) or no difference at all (Boocock *et al.* 1967; Keach and Pierfy 1972; Fennessey *et al.* 1972). The "conventional method" against which the simulation/game is compared differs from study to study, immediately raising the question of generalizability. Baker

used a "textbook approach"; Wing used "conventional classroom methods, with a teacher considered to be especially talented and creative"; Keach and Pierfy used a "programmed text"; and Fennessey *et al.* testing third, fourth, and eighth graders, used films, filmstrips, science experiments, and demonstrations.

Baker, Wing, and Keach and Pierfy also administered delayed post-tests for retention. Baker found that students exposed to the simulation/game scored higher on the immediate posttest than control students scored. Between the first posttest and a second delayed posttest, the game-playing students "forgot" a greater percentage of historical facts than the control students; however, the game-playing students' score was still higher because of their greater initial learning. Wing found no significant differences in retention between groups. The fifth graders who played the simulation/game designed by Keach and Pierfy retained more knowledge of geographic "facts" and "strategies" but retained no more "skills" than did the control classes.

Keach and Pierfy conclude that a simulation/game--properly designed--is a viable way to teach facts, observing: "A key factor in the game's design should be the built-in opportunities to apply the knowledge that the game teaches." (Keach and Pierfy 1972, p. 37) Stembler, who found that a simulation/game taught "cognitive type information" significantly better than "the conventional lecture method," also comments on the necessity for proper game design to bring about this sort of outcome:

> To teach in the cognitive domain, simulations must abandon the traditional open-endedness approach. . . . The simulation should be designed so that the participant must reach a predetermined goal or conclusion. In other words . . . the simulation must employ the guiding qualities of programmed instruction. (Stembler 1972, p. 31)

Most studies of outcomes have not been designed as comparisons between game-playing and non-game-playing populations but simply have delved into the question of what students learn. Sometimes outcomes are based on self-report of what subjects felt they learned, as well as on actual testing. Outcomes reported by this group of studies mainly focus on attitude change. These studies are based on the assumption that increased information stimulates attitude change. "Information," in this case, means not only factual data but the total effect of experiencing the simulated situation. (Livingston,

1970a, p. 7; Fletcher 1971b, p. 447)

A number of studies report the game's effect on attitudes toward specific content dealt with or the specific role played in the game. For example, Life Career gave boys a greater appreciation of the disadvantages of being female and made them more sympathetic to potential school dropouts, although girls became less sympathetic to dropouts (Boocock 1966). NAPOLI caused college students to view politicians more positively (Heinkel 1970, p. 33), and a simulation of parliamentary procedure helped students form positive and realistic views of the merits and faults of the Constitution (Stadsklev 1970, p. 77).

Boocock and Coleman (1966) used early versions of Life Career, the Legislative Game, and the Disaster Game at two 4-H conferences. They found the games increased players' sympathy for people who must cope with the issues generated by the games. All three games stimulated greater awareness of the complexity of real-life situations. While players became more aware of the difficulties of decision making in the real world, they also believed they had learned better strategies for coping with the real world.

This kind of finding raised the question of whether simulation/gaming usually can be expected to increase the player's general feeling of efficacy--his ability to understand and control the world around him. Boocock *et al.* (1967) hypothesized that feelings of efficacy might develop through experiences in which self-determined actions were effective. They tested whether simulation/games might provide such experiences. They found no increase in any "global sense of control," but did find positive changes in the way players perceived planning ahead, the future, learning, and self.

There have been a series of studies testing the effect of the simulation/game Democracy on attitudes. "Unmotivated" junior high students in a special summer program became more cynical about their ability to affect the political process after playing Democracy (Cohen 1969), although the game seemed to strengthen feelings of political efficacy in sixth graders (Vogel 1970; 1973). In recent studies, students found "log-rolling" (a behavior necessary for success in both the simulated and real legislative environments) much more acceptable after playing Democracy. Ninth, but not eighth, graders showed an increased sense

of political efficacy. However, neither eighth nor ninth graders showed an increased interest in participating in the political process as a result of the game. (Livingston 1972a, 1972b) Tenth and eleventh graders found "log-rolling" an acceptable part of the legislative process after playing the game, but they also sensed that political bargaining reduces the influence of individual constituents. (Livingston and Kidder 1972)

In another study of attitude change, students developed greater sympathy for the problems of the poor after playing Ghetto, although they were less optimistic about being able to ameliorate them. (Livingston 1970a) There was no consistent relationship between degree of attitude change and degree of understanding of the game, nor did the attitude change last long. (Livingston 1971) Kidder and Aubertine found that one play of Ghetto made high school seniors more pessimistic about ghetto residents, as well as about people in general. After three days of playing the game, however, subjects' attitudes approached their original levels of affect, which the authors noted to be "abnormally" positive, perhaps as a result of social expectation to think positively. (Kidder and Aubertine 1972, p. 8)

All in all, the data suggest that games can increase sympathetic understanding about problem situations in which people find themselves--as represented by the roles in the game--but this effect may not be enduring. Also, games do not seem to improve a player's sense of control over the real world. The attitude change which results from simulation/gaming tends to be game-specific.

Researchers have commented on strategic or relational thinking they have observed during their research with games, although there are still few data available concerning such outcomes. Schild found coping strategies to be one of the most important results of the Parent-Child Game (now Generation Gap). Using groups of university undergraduates and black high school students, he found that all players discovered strategies of cooperation and reciprocation which improved their scores from round to round. He observed:

> the learning of strategies has in a sense more priority over other possible learning. It is the most direct outcome of

> playing a game and, thus, I would conjecture, the point where the game is likely to have the strongest impact. (Schild, in Boocock and Schild 1968, p. 151)

Underachieving boys felt that playing simulation/games taught them more than was actually contained in the games themselves. Apparently this was because the games helped focus and integrate other material. Concerning this experiment, Farran says the games seem to act "as a frame of reference to unite separate ideas students have learned prior to encountering the games," and concludes that games are unique in providing active arenas for "decision-making, relational thinking and planning." (Farran, in Boocock and Schild 1968, p. 198)

The literature currently includes only a few studies which conscientiously attempt to evaluate these more complex or "higher" levels of cognitive outcomes. These studies provide conflicting results. Chartier, in one of the more elegant comparisons of different teaching methods, tested subjects for six types of cognitive outcomes: knowledge, comprehension, application, analysis, synthesis, and evaluation. These cognitive outcomes and their related test items were based on the *Taxonomy of Educational Objectives, Handbook I: Cognitive Domain* by Bloom *et al.* For none of the six types of cognitive outcomes did Chartier find any significant difference between experimental groups. The four groups of adults, respectively (1) played and discussed a simulation/game, (2) played but did not discuss the game, (3) discussed but did not play the game, and (4) studied the simulation/game following individual study guides. Each group spent the same amount of time in the activity. (Chartier 1972)

In an attempt to tap some of the same "higher" cognitive outcomes, Croft administered a general test of critical thinking abilities both before and after college students played Rinnsal, a geographical simulation/game he designed himself. On the posttest, students showed a significant increase in critical thinking abilities ("inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments"). They also showed "an improved attitude toward learning in the areas of attitudes toward school, study, and planning . . ." (Croft 1973, p. 15)

In an imaginative attempt to capture the sort of learning presumed to accompany simulation/games, Fletcher and Dobbins evaluated ability to make accurate predictions about the outcomes of alternative actions in a situation where a decision had to be made in the face of conflicting

legal and ethical concerns. (Fletcher and Dobbins 1971) They tested tenth graders before and after the experimental group played a simulation/game based on a case study that the control class only read and discussed. After the game, all students were tested on their ability to make predictions in analogous cases as well as in the situation on which the simulation/game was based. The experimental group became significantly better than the control group at making predictions in analogous cases.

These researchers point out that the control groups, in a comparative study such as theirs, likely feel gypped out of the "fun" of playing a game and, perhaps, work less hard than usual on the "normal" activity. (Fletcher and Dobbins 1971, pp. 11-12) The reverse phenomena, the well-known "Hawthorne effect," may well be operating within the experimental groups, stimulating them to greater efforts. If both factors operate at once, this could, of itself, account for "superior" results from game-playing groups, such as Fletcher and Dobbins obtained. Chartier's study is the only one in the literature in which an attempt was made to control the Hawthorne effect by involving all subjects with the same simulation/game in some manner or other. (Chartier 1972)

What Affects Learning?

There have been several investigations of individual characteristics, and a couple concerning group characteristics, that might be presumed to affect learning during a simulation/game. Recently there have been two studies concerning the effect of simulation/game design on learning. The discussion that follows considers individual characteristics first, group characteristics second, and game characteristics last.

Edwards, using Trade and Develop, found no relationship between the general "ability" level of eighth graders and their capacity to develop successful game strategy. Ability level did, however, affect the degree to which a player could understand the game or its analogies to real life. (Edwards 1971, p. 10) Fletcher found this same difference in his studies of fifth and sixth graders using the Caribou Hunting Game (from *Man: A Course of Study*). Development of successful game strategy (strategic learning) came under a general behavior

he called "quality of play," which was not significantly affected by ability. The capacity to apply game-learnings to other settings was more like other abstract cognitive skills already taught in schools, he concluded, and he found it more likely to be characteristic of brighter students. (Fletcher 1971a, pp. 276-277) Both studies support Schild's conjecture, cited earlier, that what games teach best is how to play games.

Reading ability was shown to make no difference between the amount of content learned by fifth graders who played Sailing Around the World and by those who studied a programmed text. This game and programmed instruction also gave the same results with both sexes. (Keach and Pierfy 1972)

Fletcher, however, found significant differences between boys and girls in ability to affect strategy in the Caribou Hunting Game. This did not lead to any differences in amount learned, but boys expressed more positive attitudes toward the game than girls did. These differences in outcomes by sex may be related to the fact that these games are based on a male occupation and/or to a cultural imposition regarding what is "appropriate" sex-linked play behavior. (Fletcher 1971a, pp. 277-278, 285-286)

The amount a player participates in the game has been shown to affect the amount learned. Zaltman, using Consumer with both teenage and adult groups, found that the more active participants learned more and developed better understanding of the consequences of their decisions because they received more information and took more chances to apply it. (Zaltman, in Boocock and Schild 1968, pp. 205-215)

A common feature of many reports on simulation/game use in the classroom is that players enjoy themselves. During playing time there is an observable atmosphere of extreme involvement. After a game participants frequently ask to play again; they also tell friends about the experience. Often enjoyment is accompanied by self-reports of a sense of increased learning. As discussed in a previous section, despite the enthusiasm over games, most experiments using objective tests show no significant increase in learning over presumably less exciting methods has taken place.

Inbar found, with 4-H members playing the Disaster Game, that both

enjoyment and learning are dependent on the way the game develops within the group. In groups where the game developed smoothly and interestingly, the initial attitudes of the players had almost no influence on the way they felt at the end of the game. If, on the other hand, the game developed in a confused or dull manner, players entering the game with negative attitudes would feel them justified and reinforced. He concluded, "the process of learning is mediated by *the general atmosphere in the group*: favorable group atmosphere induces general high enjoyment--as well as high individual learning" (author's italics). (Inbar, in Boocock and Schild 1968, p. 181)

In this same study, Inbar also noted that group size affects learning: "In overcrowded groups, players learn the rules less efficiently, interact less, are less interested in the session and participate less actively in it; as a consequence, they tend to play a lesser number of moves and the impact of the game is weaker." (Inbar, in Boocock and Schild 1968, p. 183) This agrees with Zaltman's finding, described earlier, on the positive relation between degree of participation and learning.

Two studies provide conflicting evidence concerning the effect of ability grouping in simulation/games where cooperative endeavors are required. Since one study concerns a computer-assisted business game and the other an elementary school board game, we can say that the question remains to be answered definitively. McKenney and Dill experimented with homogeneous ability grouping of graduate students in a business administration game. They found that the initial tasks of the game--role learning, discrimination of significant information, team organization for decision making--overwhelmed teams composed of lower ability students who lacked the leadership capacity to get through the initial complexity. This led to "reduced effort" and resulted in "poor performance and low satisfaction," although these effects may have arisen partially from resentment over the obvious bias of team assignments, the authors suggest. (McKenney and Dill, in Boocock and Schild 1968, p. 229) Fletcher had three-person groups in his study using the Caribou Hunting Games. He found that the ability (and sex) mix of the group had little or no effect on learning or enjoyment. (Fletcher 1971a, p. 278)

A third study in this area, although not dealing with learning, *per se*, throws an interesting sidelight on the matter of ability mix in cooperative teams. Junior high boys played an adapted version of Seal Hunting on school time but apart from their regular classes. They were told the activity did not affect their grades. Prior to playing, the boys ranked each other on "perceived academic ability." The experiment showed that "perceived academic ability" was highly correlated with power and prestige within the four-boy groups that played the game. The authors conclude "that generalized academic performance expectations act like a diffuse status characteristic or a general performance characteristic in affecting the performance of children engaged in a new school task . . ." (Hoffman and Cohen 1972, p. 28)

Livingston and Kidder conducted two studies in which they attempted to identify the features of Democracy that make it effective in teaching players that "log-rolling" is a useful and acceptable part of the legislative process. (Livingston and Kidder 1972; Livingston 1972b) They found that both "game structure" and "role identification" contribute significantly to the outcome. "Game structure" means the rules, such as those regulating scoring and order of play, "which represent the game designer's attempt to reproduce what he considers to be the main incentives and constraints that guide the behavior of real congressmen." "Role identification" includes all features that inform the player he is a congressman. (Livingston 1972b, p. 1) Livingston feels the results of these two studies "imply that the players' roles in a simulation/game should be clearly identified if the game is to attain its maximum effectiveness at teaching the players about the behavior of people in the real-world situation that the game represents. They also imply that, insofar as this behavior is rational, a true simulation/game is likely to produce better understanding of it than a role-playing exercise." (Livingston 1972b, pp. 10-11)

How to Use a Simulation/Game

This section deals with research findings and implications concerning how to use a simulation/game in the classroom. It addresses itself to the following questions: (1) Where in the unit is the best place to use a game? (2) Is one play of the game enough? (3) How necessary is a

debriefing discussion?

In an early study, Livingston reported on three experiments dealing directly with the relation between a simulation/game and surrounding unit material. He hypothesized that playing Trade and Develop would motivate junior and senior high students to superior learning of related subject matter presented after the game and that the game would act as an organizational framework aiding the subsequent learning. Apparently the game acted neither as a motivator nor an organizer for the related material, as students who played the game showed no more motivation or learning than students who did not. (Livingston 1970b)

As the result of his more recent study using Ghetto, Livingston suggests a different reason for placing a simulation/game at the beginning of a unit. Since playing the game was shown to induce a temporary attitude change, this "may make the students more receptive to the related instruction which follows the game." (Livingston 1971, p. 7) Kidder and Aubertine agree, suggesting that a game should start a unit in order "to create more realistic attitudes toward the material being covered in the unit." (Kidder and Aubertine 1972, p. 10)

However, Starbuck and Kobrow discovered that their graduate business game became a check for the teacher on how well students had assimilated what had been taught earlier. They conclude, "the game [is] an excellent medium for driving home fundamental concepts and for uncovering and correcting gaps in basic understanding." (Starbuck and Kobrow, in Boocock and Schild 1968, p. 238) This leads one to feel that a game may be most useful mid-way in a unit to allow time for correction of errors and reinforcement of ideas. On the other hand, the integrating and organizing effect Farran found games to have for underachieving students implies that a game may be best placed at the end of a unit. (Farran, in Boocock and Schild 1968, pp. 191-203)

In summary, the research does not provide clear guidelines for determining where to use a simulation/game in relation to related material. Many studies do imply that optimal placement is related to desired learning outcomes. Other research hints there may also be relationships between optimal placement and (1) the type of student involved, (2) the purpose of the activity, and (3) the complexity of

the game. Thus, it appears a teacher can increase the impact of a simulation/game by integrating it with other material in a way which enhances preestablished learning outcomes.

A common practice in simulation/game studies has been to allow players to go through the game only once, on the assumption that mastery of the mechanics of playing is equated with mastery of the simulation/game, *per se*. This assumption can be challenged on the grounds that strategic insights and planning develop only after the game mechanics are reasonably under control by the player. This process may take more than one play or round, depending on the game's complexity and the sophistication of the players.

One could conclude that players in most reported experiments did not have the opportunity to play with much insight, and certainly not with maximum insight. One might also conclude that findings from such experiments (where players had not mastered the game) do not reflect the true potential of simulation/gaming as a learning technique. These tentative conclusions are given some support by results showing that a player's learning increases with the number of plays.

Edwards found players learned more from two games of Trade and Develop than from one but no additional learning occurred as a result of playing further or playing an advanced version. He suggests rather than playing the game several times consecutively, it would be more useful to play such a game periodically, interspersed with related activities. (Edwards 1971, p. 9) This approach was successfully used by Gearon to teach Civics. (Gearon 1968, p. 274)

In his study with the Caribou Hunting Game Fletcher found learning continued to increase over six game plays, and students had not yet mastered the game at the end of the six plays. He also found that students who were led by their teachers to "reflect" on the experience as they went along--that is, to study the results of completed games and plan for the next game--learned significantly more than students who did not discuss and reflect upon what they were doing. (Fletcher 1971a)

Fletcher and Dobbins (1971), in their study cited earlier, allowed students to play the game to the point of mastery and gave players time for a thorough post-game discussion of both the game and the case study

(model) on which it was based. The experimental group showed considerably more cognitive gains than the control group which only discussed the case study.

These last two studies raise the question of the value of reflective discussion *vis-à-vis* the game experience. Numerous practitioners and designers have claimed that discussion (usually "post-game discussion") is necessary to reap the full potential of simulation/games. They feel discussion helps translate the game experience, which is mostly personal and affective, into social and cognitive understandings. (Harry 1969, p. 9; Chapman forthcoming 1974) Some researchers, however, argue that post-game testing must occur immediately after the game and that uncontrollable vagaries of a post-game discussion, especially if more than one teacher is involved, can "contaminate" the results. (Keach and Pierfy 1972) It has been fairly common to allow players little or no discussion in simulation/game studies raising the question of whether this research procedure might "contaminate" results by omission.

Chartier's study (1972), mentioned earlier, addressed itself directly to the relation between discussion and a simulation/game. He found that subjects who played and discussed Generation Gap learned no more, cognitively, than subjects who spent the same amount of time either just playing the game or just discussing the game, or subjects who studied the game with individual study guides. This finding does not support those who claim reflective discussion is necessary for players to articulate cognitive outcomes. It may be significant, however, that Chartier's subjects were adults. His study should be replicated with younger subjects to see if his finding holds true for children. Fletcher's finding (1971a)--on the value of reflective discussion for fifth and sixth graders--is in direct contrast to Chartier's findings.

Some further implications on the value of game-related discussion and repetition of game play can be drawn from a study by Kidder and Guthrie on the use of a training game. (Kidder and Guthrie 1972) The authors define a training game as one that attempts to improve the student's ability to perform in a real situation, as distinguished from a teaching game, which attempts to increase understanding and knowledge.

Four adult groups were compared on both a written test and a measure of performance in a simplified reality situation. One group received no treatment; one heard a lecture; one played a training game, followed by less than ten minutes of discussion; and the fourth played the same game, discussed it for about 25 minutes, and replayed the game. Although the last group scored no better on the written test than the others, these subjects scored significantly better on the performance test.

Although one is again conscious of the question of whether these same results would occur with young people, the superior results from the group that used the game comprehensively (more thoroughly) parallels the Fletcher and Dobbins findings with tenth graders. Furthermore, one could argue that behavior modification *is* a goal, in some cases, of "teaching games"; thus Kidder and Guthrie's findings apply to certain teaching games and certain uses of teaching games, as well as to training games.

Other Research

This section reports on the only study of teacher behavior and its two validity studies.

Oswald and Broadbent (1972) had student teachers conduct a simulation (which was not a game) of a Town Board meeting with third- through sixth-grade students. The teachers had been rated on their "conceptual level." In contrast to high conceptual-level teachers, low conceptual-level teachers (1) used less indirect teaching behavior during both the simulation and the debriefing, (2) talked more, and (3) spent more time introducing the simulation to the students. In other words, they structured the lesson more. Also, low conceptual-level teachers expressed less satisfaction with the activity and attributed perceived student gains to teacher efforts more than did the high conceptual-level teachers.

These researchers conclude, "the fact that a teacher varies teaching activities does not insure that teacher behaviors will also vary" (author's underscoring). (Oswald and Broadbent 1972, p. 12) They suggest "that minimally structured activities would be more satisfactorily used by high conceptual-level teachers than by low conceptual-level teachers." (Oswald and Broadbent 1972, abstract)

Users would like to believe that authors and publishers of simulation/

games have checked or tested their games to assure an accurate representation of the reality the game supposedly simulates--that is, that they have validated the game. How this validation has been done generally is not revealed by the publishers--often because it has *not* been done. Only recently have two attempts at formal validation of a specific simulation/game been reported in the literature. (Boocock 1972; Russell 1972)

Both Boocock and Russell begin with an admission that there is not yet general agreement on criteria for testing validity of a simulation/game, and both demonstrate what was already known--to validate something as complex as a human-actor simulation is a prickly undertaking. One significance of the concern with validation is the underlying requirement that the game model must be clearly spelled out in order to test the validity of a simulation/game. Hopefully, this will lead to more sophisticated and conscientious model design in the future than has been accepted in the past.

Where Does This Leave Us?

After this much detail on what we do not yet know about the nature of simulation/games and their use, one feels a bit depressed--or exhilarated, perhaps, if one is searching for a dissertation subject. Clearly, there is much yet to be explored in the area of educational simulation/gaming. The diffuse focus of research design and the scattered results are symptomatic of the infancy of a new discipline.

Kuhn proposes three major types of research that occur sequentially as a conceptual system adapts to innovations. Although he developed his model to deal with the "hard sciences," the existing experimental data in simulation/gaming seemingly follow the same pattern. (Kuhn 1962, pp. 25-29)

During the first stage of innovation, the major need is to increase the accuracy and scope of the theory. In simulation and gaming, this stage is represented by the spate of articles and books concerned with definitions and descriptions. There has also been a rapid increase in the number of games and simulation/games put on the market.

In the second stage, there are attempts to bring reality and theory together. The initial enthusiasm for games arose out of an

expectation about what it was thought they could do. It is beginning to be seen that these expectations were overly optimistic and sometimes inaccurate. However, because of the incomplete and uncoordinated approach to experimentation, valid generalizations are scarce, and reality and theory remain widely separated. Research in the social sciences as a whole is fraught with problems of controlling a variety of human and environmental variables. The human element creates many problems of validity and reliability. These problems apply equally to gaming.

During the third stage of innovation, empirical work is undertaken to articulate the theory more precisely, determining generalizations which are then applied to new areas of interest. Because of the newness of simulation/games at all levels of education, very little such work on articulation and application has been done.

Over the past two years, a counterpoint has arisen against the main chorus of hosannas blessing simulation/games. In late 1971 Fletcher announced, "There is simply no excuse for continuing to fill journals with studies when each one uses different independent and dependent variables, when each one uses different instruments, resulting in findings which are neither cumulative nor comparable." (Fletcher 1971b, p. 451)

In this long, thought-provoking article, Fletcher suggests a general program of research intended to result in cumulative, comparable findings. He suggests seven steps necessary in order to proceed with systematic research on simulation/gaming.

1. To select a set of games which everyone will agree are games . . . We should weed out any which are not completely debugged, and from the remaining ones that we know can be used in a consistent fashion across different experimental sites, select, at random if no other way, ten or fifteen which represent the range of the available games.
2. To select and define a set of "important" characteristics to vary systematically . . .
3. To determine the degrees of variation in each of the characteristics chosen for systematic experimental manipulation.
4. To incorporate, for each of the selected games, these degrees of variation into the game, producing different versions of the game, each incorporating a different variation.

5. To define the player characteristics which we think are most important to record, and the dependent variables we feel are most important to explore . . .

6. To develop instruments which are comparable across the set of games, yet, particularly in the case of the dependent variables, are specific to each game.

7. To set up standard data-handling procedures. (Fletcher 1971b, pp. 451-452)

It is a long step from where we are now in simulation/game research to Fletcher's seven steps. The considerable coordination--to say nothing of agreements--his research program would require among educators would be an innovation of itself. Imaginative data-gathering instruments would have to be designed and validated. Creation of different game versions would demand a higher level of creativity than has been generally exhibited by simulation/game researchers. The overall design of an experiment would have to be more rigorous and administration undoubtedly would be more complex. In short, input determines output. To produce articulate and applicable findings regarding simulation/games--to move into Kuhn's third type of research--more focus and artistry are needed.

Incorporating Simulation/Games into Curriculum Plans

Thus far in this paper we have discussed the evolution of the use of simulation/games in education; the many definitions that usually arise when some new discipline or sub-discipline is introduced; the general philosophy behind the introduction of simulation/games into education; and the research results that have bearing on simulation/game use. All of these topics are important and worth treatment. However, we feel that one important and practical question has been slighted. That is, when should simulation/games be used and where should they be placed in curriculum plans?

Potential simulation/game users face a mass of wrappings, boxes, and publishers' advertisements, unadorned by guidance in the use of this new educational technique. Often reacting to a current "fad" of simulation/game use, users try a simulation game with students without themselves having much previous knowledge of gaming strategies, debriefing techniques, or means of integrating simulation/games into a curriculum plan. Based on the limited information available, the simulation/game

is either rejected or accepted as being (in)effective or (in)appropriate.

Existing Guidance on Integrating Simulation/Games in the Curriculum

Aside from the few studies mentioned in the subsection of the preceding research review on "How to Use a Simulation/Game," there has been very little research directly focused on this question. There are indications that optimal use and integration might have something to do with desired learning outcomes, the relationship of those objectives to the non-simulation/game material in the curriculum, the complexity of the game, and the types of students using the game. Little hard information is known beyond these four possibilities.

Folk wisdom has suggested a variety of uses for simulation/games. Among these are:

--Use games only after a unit is complete, as culminating activities.

--Use games as a reward for students who have completed their assignments.

--Use games when it is time for a change of pace.

--Use games to introduce a unit and to motivate students.

--Use games anywhere as long as the teacher is comfortable with them.

--Well, it depends on the objective.

Although perhaps somewhat helpful as a reflection of the experience of those who have used simulation/games in the classroom, the folk wisdom does not get us very far either.

Some theoretical work has been done by Twelker and Layden, who developed an analytical framework to assist users in planning for use and placement of simulation/games. They identify four kinds of simulation/games:

1. non-simulation games--played in competitive contexts where user success depends on degree of subject matter comprehension demonstrated during game play.
2. planning exercises--played in competitive context where process is the focus and where the task is to seek solutions to social problems.
3. inter-personal simulation/games--played in a somewhat competitive context with the focus on a player's responding within the simulation/game experience as if he/she were in the actual system of interaction.
4. large system simulation/games--played in minimal competitive context

where focus is on examination of dynamics of complex systems of interaction. (Twelker and Layden 1972, pp. 2-3)

Twelker and Layden go on to list 12 differentiating characteristics of these four kinds of simulation/games. Characteristics include cognitive and affective outcomes, ease of insertion into curriculum peer interaction, etc. Each of the four types of simulation/games is rated from low (1) to high (5) in one each of the 12 characteristics. For example, a non-simulation game rates high (5) on each of insertion into the curriculum, whereas a large system simulation game rates a 3. If the user were thoroughly familiar with the specific kinds of simulation/games identified, the Twelker-Layden analytical framework would be very useful in helping make selections of simulation/games for classroom use at particular points in the curriculum sequence.

The Need for Further Development of an Analytical Framework

In the authors' opinion, the Twelker-Layden framework is not sufficiently developed to provide the assistance practitioners need. Simulation/game users need a framework that will help them identify and analyze the most significant characteristics of simulation/games and the outcomes to which those characteristics are most likely to lead (which are not necessarily the same outcomes as those intended and described by the simulation/game developer). Knowledge of the probable outcomes of a specific simulation/game will help the user do one of two things: (1) given a particular objective for a specific point in the curriculum sequence, to determine whether the particular simulation/game is likely to accomplish that objective; or, conversely, (2) given the likely outcomes of a particular simulation/game, to determine at what point in the curriculum sequence it will fit best.

A simple example is the following: suppose a teacher wants to do a unit on poverty. He has determined that the introduction to this unit should stir the students' emotions and "get them involved" personally with the issue. He things, "Ah--a simulation-type activity might do the trick! Everyone says they get kids involved!" The first simulation/game he looks over is structured in such a way that emotional involvement is down-played, though intellectual involvement would appear to be potentially high once the students knew something about poverty (even

though the simulation/game developers state in the teacher's guide that one of the objectives of the activity is to heighten awareness of and empathy for the plight of the poor). Thus, he decides that this simulation/game won't do for a "starter," but would make an excellent summary activity for later in the curriculum sequence on poverty. For the unit opener he searches further for a simulation-type activity that has characteristics eliciting affective outcomes.

Development of the Analytical Framework

In an attempt to find out more about optimal use and placement of simulation/games, the authors surveyed a number of well known social studies curriculum materials packages containing simulation-type activities. The developers of these packages all faced the problems of integrating such activities into the curriculum sequence at the most appropriate points. All these packages underwent a number of cycles of field-trials, and thus they are assumed to be teachable and learnable. The materials represent tested ideas about how simulation-type activities can be incorporated into curriculum plans. Thus, the authors accept them as exemplary instances of use and placement, as well as design, of simulation-type activities.

Approximately 25 curriculum packages containing simulation/games were surveyed in all. Of these, seven sets of materials were selected for a detailed analysis of their structure and organization.* The materials were: *From Subject to Citizen* (developed by Education Development Center); *Man: A Course of Study* (also developed by Education Development Center); *Geography in an Urban Age* (developed by the High School Geography Project of the Association of American Geographers); *Economic Man, Families and Firms*, and *Elementary Economics I* and *II* (developed by the Elementary Economics

*The starting point for the detailed analysis of the curriculum packages was the *Curriculum Materials Analysis System* (CMAS). (Knight, *et al.* 1971) Although the CMAS does not focus specifically on the placement of simulation/games within a curriculum plan, the sections of the System dealing with learning objectives and teaching proved most useful. These sections allow for analysis of objectives according to the taxonomies of Bloom and Krathwohl (Bloom 1967; Bloom, Krathwohl, and Masia 1956), as well as the analysis of the actions and interactions between and among the teacher, students, and classroom resources.

Project of the University of Chicago's Industrial Relations Center); *Social Science Laboratory Units* (developed by the Elementary Social Science Education Program at the University of Michigan); *Episodes in Social Inquiry, Readings in Sociology,* and *Inquiries in Sociology* (developed by Sociological Resources for the Social Studies, a project of the American Sociological Association); and *American Political Behavior* (developed by the High School Curriculum Center in Government of the University of Indiana). (Bibliographic information is given in the "Bibliography of Curriculum Packages Analyzed in Detail" at the end of this paper.)

These seven detailed analyses, plus the framework already proposed by Twelker and Layden and the research reviewed earlier in this paper, gave us a substantial number of insights about the use and placement of simulation-type activities in a curriculum sequence. These insights--or perhaps they might be better termed "guidelines"--are of two sorts. First, we present in the following subsection of this paper six "general observations" about use and placement of simulation/games in the curriculum packages analyzed. These give some helpful overall guidelines to users. Second, we present in the more extensive subsection following the general observations an analytical framework to guide decisions on the use and placement of particular simulation-type activities within curriculum sequences. This framework differs from the Twelker-Layden framework in that we have limited the number of differentiating characteristics and have identified five (rather than four) different kinds of simulation-type activities.

General Observations on Simulation/Game Placement

The following six observations are based on our analysis of the seven curriculum packages. They represent some ideas that we feel should be kept in mind when thinking about using simulation-type activities in a curriculum plan. As presented, they imply no suggested order of priority.

1) Simulation-type activities require both the acquisition of certain skills (e.g., speaking, role-taking, calculation, computation) prior to engagement in the activity *and* allow for the practice of the skills. For example, in The Game of Farming from the High School

Geography Project, students are required to use previously taught arithmetic skills. (*Geography in an Urban Age* 1969, Unit 2) In the *Families and Firms* program from the Elementary Economics Project, students practice negotiating over prices and wages in "mini-games" prior to extensive use of negotiation skills in the simulation/game, ECONOMY. (Chapman forthcoming 1974)

2) The use of several simulation-type activities within a curriculum sequence permits the learner to become aware of interactions of subsystems with larger social and physical systems. For instance, the activities Section and Point Roberts from Unit 4 of the High School Geography Project illustrate this observation. Section is a role-playing activity in which students portray citizens and legislators in a hypothetical state. Two primary objectives of Section are to have students become aware of some of the problems that society and government face and to become aware of some of the geographic (physical) implications of legislative (societal) actions. In Point Roberts students role-play members of the International Joint Commission, United States and Canadian negotiating teams, the Arbitration Commission, and private citizens in an international boundary dispute. One primary objective of Point Roberts is to have students recognize that boundaries interrupt the flow of people, commodities, and services.

3) The use of simulation-type activities permits a change of teaching-learning mode. In almost all curriculum materials packages analyzed, there is considerable teacher-to-student (lecture, teacher-led discussion, etc.) and resource-to-student (films, filmstrips, text, etc.) action prior to the engagement in a simulation-type activity. (This is not to say that there is no opportunity provided for student-student or teacher-student *interaction* prior to game play.) Simulation-type activities permit a change of mode by facilitating a high degree of student-student interaction.

4) Simulation-type activities are often repeated within the curriculum, thereby allowing for accumulation of skills and information and maturation of strategic thinking. Two kinds of repetition seem to predominate. The first is the repetition of similar activities throughout a unit. For example, the upper elementary *Social Science Laboratory Units* use role-playing repeatedly throughout the units. One purpose of

repeated role-playing is to produce different behavior specimens to be observed and interpreted. As role-playing is repeated throughout the units, students become better at assuming assigned roles. Also, some of the role-playing situations in later lessons within units involve more complex behavior situations.

The second kind of repetition begins with a basic and fairly simple model of a simulation or simulation/game. The basic model is repeated throughout the unit as more variables are introduced, thus making the simulation or simulation/game increasingly complex. One example of this kind of repetition comes from the unit *Simulating Social Conflict*, one of the *Episodes* from Sociological Resources for the Social Studies. Students begin the unit simulating a relatively simple conflict situation among groups trying to protect their own interests. Throughout the unit, additional concepts are added, such as trust, win-lose situations, and win-win situations. [This same pattern of basic-game-with-variation also is seen in a number of free-standing simulation/games, such as Economic System and The Community Land Use Game.]

5) How complex the simulation-type activity should be usually depends on how much previously learned information the student can be expected to bring to the activity. Early activities in a curriculum plan are likely to be quite simple in terms of what the student must know to participate effectively. Simulation-type activities that are found later in a curriculum plan are likely to be more structured and complex, requiring the student to become more analytical and to use previously learned information.

For example, Caribou Hunting, which occurs early in the unit on the Netsilik Eskimos (*Man: A Course of Study*) and the early activities from Unit 1, "Learning to Use Social Science," in the *Social Science Laboratory Units* do not require much previously learned information in order for the student to be successful in the activity. Examples of more complex simulation-type activities that occur later in curriculum plans are Bottleneck from *American Political Behavior*, The Game of Farming from Unit 2 of the High School Geography Project, and Armada and Empire in *From Subject to Citizen*.

6) Simulation-type activities are often placed in a curriculum

plan to enable students to integrate a number of previously learned concepts. For instance, the simulation Portsville from Unit 1 of the High School Geography Project is an excellent example of this observation. Prior to engaging in the Portsville simulation, students have been engaged in learning the following skills or major ideas: site features and locational factors influencing city growth, locational advantages and disadvantages, urban analysis, interpreting maps and aerial photographs, hypothesizing, working with abstractions and theories, analyzing a whole city, and using the scientific method. In Portsville the major ideas and skills are "urban synthesis" and "skills in working in a group to make logical decisions about how a city may have been organized at a given time period under given conditions." In the activity, groups of students actually construct a city to scale.

A Framework for Analysis of Simulation-Type Activities

Learning Outcomes and Structure. In our analysis of the seven curriculum materials packages, we observed several different patterns of using simulation-type activities. Frequently, structured role-plays and certain types of simulation/games are used to encourage personification and dramatization, while pure simulations are used to demonstrate a system or model with a minimum distortion of a real-world situation. Discipline areas, such as social psychology, that focus on examination of participants' perceptions or group processes generally use role-playing and role-playing simulations. Where economic questions are under study, games and strategic simulations predominate.

Our analysis has led to the conclusion that different activities, with their different characteristics, are appropriate to different kinds of learning outcomes. Further, it appears that certain characteristics tended to cluster into one or another of a limited number of typical "structures." This structure is not separate from, but rather actively promotes, certain learning outcomes; different structures promote different types of learning outcomes.

The structure of a good simulation-type activity focuses attention on the central problem of the activity (a specific desired learning outcome) through appropriate deployment of player goals, player tasks, and game materials. In less successful simulation-type activities, the

problem is often that the structure of the activity clashes with the stated learning outcomes. For example, it seems likely that strong involvement with a role is usually antithetical to analytical thinking. Role identitites depend upon emotional intangibles, while analytical thinking tends to be concerned with external objects. (Clayton and Rosenbloom, in Boocock and Schild 1968, p. 89) Thus, if, in a role-playing simulation/game, a stated learning outcome is "meaningful identification with the persons represented in the roles" but the players' resources and goals are defined in terms of tokens or points, participants will tend to play analytically (computing gains and trade-offs in tokens or points), with less concern for emotional communications and identifications. In such a case, the simulation/game structure would contradict the stated learning goal of role identification.

We have already reported there is some literature that contends the real message of a simulation/game lies in its structure (design). Washburn, for example, poses such questions as: "How much do events in the game seem to be controlled by unseen forces? What does that say to the player? . . . Why is the game so competitive, and why is this particular societal myth reinforced through the game?" (Washburn 1972, p. 102) Clearly, an activity implies that certain behaviors are important and correct when they are allowed and rewarded. That simulation/games have this impact is corroborated by Livingston and Kidder's findings, cited earlier, and their implications: "The curriculum designer who wants the students to become more inclined to accept some real life activity as necessary or desirable should use a simulation/game rather than a role-playing exercise. That is, there should be rules and a scoring system to motivate and control the players' behavior." (Livingston and Kidder 1972, p. 12)

The Framework. On the following page is presented the analytical framework we have derived from our analyses and the research and theoretical literature reported in this paper. The framework identifies five different categories of simulation-type activities, each with a different set of structural characteristics leading to associated learning outcomes (or, in other words, promoting a typically predominant "problem orientation").

The Framework distinguishes five categories of simulation-type

Table 1

FRAMEWORK FOR ANALYSIS OF SIMULATION-TYPE ACTIVITIES

TYPE OF ACTIVITY	PREDOMINANT PROBLEM ORIENTATION (Probable Learning Outcome)	STRUCTURAL CHARACTERISTICS			
		PRIMARY ROLE DEFINITION	GROUP SIZE	COMPLEXITY OF ACTIVITY	PROBLEM-SOLVING MODE
Role-Play	Affective	Qualitative	One-to-one	Single system Real time No chance	Negotiation Informal Non-zero sum
Simulation exercise	Either affective or cognitive	Either qualitative or quantitative	Either one-to-one or one-to-many	Single system Simulated time No chance	Negotiation Informal Non-zero sum
Simulation/game emphasizing role playing	Mixed affective and cognitive	Mixed qualitative and quantitative	One-to-many	Several systems Real time Chance varies	Negotiation Informal Non-zero sum
Simulation/game emphasizing strategy	Cognitive	Quantitative	One-to-many	Several systems Simulated time Chance varies	More formal negotiation Non-zero sum
Game	Cognitive	Quantitative	Either one-to-one or one-to-many	Single system Real time Chance significant	Little or no negotiation Zero-sum

activities: Role-play, simulation exercise, simulation-game emphasizing role-playing, simulation-game emphasizing strategy, and game. For all of these except "simulation exercise" we adhere to the definitions discussed on pages 4-16. A "simulation exercise," in this framework, is a non-game, human-actor, simple, educational simulation, usually of limited focus. A simulated town meeting (in which players are not assigned roles) would fall in this category. The term "simulation exercise" is also used in order to include simulations in which participants represent non-human entities.

Each type of activity is classified according to five characteristics. Four are structural characteristics: primary role definitions, group size, complexity, and problem-solving mode. The fifth describes the probable learning outcome (the predominant problem-orientation) of the activity.

1) Predominant Problem Orientation (Probable Learning Outcomes). The predominant problem orientation of a simulation-type activity establishes the probable learning outcome(s) of that activity. For all intents and purposes, the problem orientation and learning outcome are synonymous. Learning outcomes are generally of two kinds--affective (those concerned with attitudes and values) and cognitive (those concerned with knowledge and the development of intellectual skills and abilities). The framework indicates that those simulation-type activities that include considerable personal involvement with a role (role-play and simulation/game emphasizing role-playing) have an affective problem orientation and presume affective outcomes. Although participants often assume some sort of role in the other three types of activities (simulation exercise, simulation/game emphasizing strategy, game), the role is less personalized and thus the involvement and learning outcomes tend to be cognitive.

2) Primary Role Definition. Two characteristics are used--qualitative and quantitative. Qualitative roles usually involve the participant in dealing with many "human" factors by requiring interpersonal exchanges necessitating advocacy, persuasion, other communications techniques, and "psyching out" actions of others. Quantitative roles usually involve the participant in controlling resources, planning and forecasting, and calculating trade-offs. Although roles, as defined, often have both qualitative and quantitative aspects (with the exception of some simulation/

games emphasizing role-playing that seem to have a balance between role definitions), primary role definitions are distinguishable. Clearly, role definition is a major determinant of problem orientation.

3) Group Size. There are two primary forms of this characteristic. If the participant is representing only one person, as in role-play or in some games, it is possible to provide individualized qualities in the description of the roles assumed. Goals in these situations will likely take on a personal character. We have labeled this form of this characteristic "One-To-One." In many simulations and simulation/games where each participant represents a group type or is the single representative of a collectivity, the participant's interests are much more likely to be of an institutional and quantitative style. We have labeled representation of a group or collectivity as "One-To-Many."

4) Complexity of Activity. The complexity of the activity will affect what groups can use it, as well as the problems within its range of focus. Complexity is determined by the amount of information generated by the activity. This is indicated, in part, by the number of systems represented in the various human roles and in the scope of the environmental response roles. Also, within each role, there may be a range of allowable responses. As the range of possible responses and the number of systems increases, players must cope with larger-scale and longer-term problems.

A role-play, for example, is a single system activity. That is, it has a narrowly-defined focus and deals with immediate issues and consequences. Real time is characteristic of role-plays. Also, no chance enters into a role-play. Simulation exercises, simulation/games, and games, on the other hand, often incorporate long-term planning and complex analyses. In this they are more like real life, where people find themselves pursuing different goals by various means. People's actions may be--or seem to be--unrelated except in their long-term consequences. The actions of one set of participants (one system) may be carried out with little direct influence from another set of participants (another system) until some inevitable link-up occurs. Time is often simulated. Chance varies from no chance in some simulation activities to outcomes based entirely on chance (games).

5) Problem-Solving Mode. Problem-solving mode seems to be partially

defined by the amount of shared information. Where there is little information about other players' strategies, extreme competition and lack of trust often results. This is typical of pure games where players see one another as having opposing interests from the start. When more information is shared, players begin to perceive common interests and are more likely to build up alliances and trust relationships.

The amount of information-sharing depends on the amount and style of negotiation allowed. There appear to be two kinds of negotiation styles. The first is formal-rule behavior in which players talk to each other because that's what the rules dictate. For example, in Market (1971), consumers and retailers bicker over the price of groceries because they must agree on a price in order that the retailer may sell and the consumer may buy.

The second negotiation style is informal-rule behavior in which responses to problems are neither forbidden nor necessitated by the rules. While formal-rule behavior usually results in bargaining behavior, informal-rule behavior may lead to cooperation through shared interests. For instance, in a simulation/game where several subgroups start out with meager resources, the groups may band together to better their mutual position. Generally, increasing the amount of time allowed for negotiations allows a progression from mere bargaining to true cooperation.

Another element in problem-solving mode is the goal orientation. If winning is a zero-sum goal (i.e., there can be only one winner with the rest losers), then the rush to win will be more intense. In non-zero sum activities, such as role-playing and many simulation/games, cooperation more likely will occur because the end-goals are less limited. Some non-zero sum simulation/games which allow players to be concerned with the quality of goals might also encourage cooperative behavior.

Under Problem-Solving Mode in Table 1, we have listed the predominant kind of negotiation (formal or informal) and the goal orientation (zero-sum or non-zero sum).

Illustrations. The following illustrations give a brief analysis of each kind of activity according to the five characteristics we identified, using concrete examples from the curriculum materials we surveyed.

1) Role-Play. The *Social Science Laboratory Units* use considerable role-play throughout. In general, objectives focus on value clarification

(analysis of affective behavior). Qualitative roles are assumed for the purpose of enacting behavior specimens. Usually the behavior specimens involve one-to-one action and interaction. Real time characterizes the behavior enacted. No chance is involved. The behavior studied usually represents a single issue, such as how a child behaves when rejected by his playmates. There are no winners or losers, and the responses from the participants (both role-playing and observing students) are not dealt with in a tightly structured manner.

2) Simulation Exercise. School Districts for Millersburg, from the High School Geography Project, focuses on two cognitive outcomes--understanding political and social implications of school district boundaries and developing skills in making and justifying decision. (*Geography in an Urban Age* 1970, Unit 4) Participants assume qualitative roles--businessman, political activist, black community leader, etc. The roles, however, represent groups. Time is simulated compared to a real-world decision-making process, and only one social system is dealt with. Negotiation procedures are informal and outcomes do not reflect winners or losers.

3) Simulation/Game Emphasizing Role-Playing. In Ghetto, participants are to gain a "feeling" for what ghetto living is like and a beginning understanding of problems associated with poverty. They assume roles in which they can become involved personally. However, these roles are defined in terms of education level, employment status, family situation, etc. In the case of Ghetto, group size is mixed; some individuals role-play only one person, others represent a family unit. A high degree of chance is prevalent in Ghetto. Several social systems are dealt with. Time is simulated, although players often do not recognize this. While the simulation/game is tightly structured, there are many opportunities for informal negotiations throughout. Unless the simulation/game coordinator wishes to have players compare relative outcomes, Ghetto is a non-zero-sum activity.

4) Simulation/Game Emphasizing Strategy. ECONOMY simulates the circular flow of money, goods, and services. (Chpaman forthcoming 1974) Players assume roles as consumer-workers or producer-employers who must plan how to use their limited economic resources in an attempt to improve their economic condition; game play is primarily a cognitive process.

Each player represents either a group of workers (a "family") or a business firm. Although players may create somewhat personal roles in ECONOMY, they tend to identify themselves primarily as members of the collective "family" or "firm." Players negotiate over prices as consumers/producers and over wages as workers/employers, representing two major subsystems of a market economy. Interaction is in simulated time. There is almost no chance factor. Although sometimes the fortunes of one player may prosper or decline at the expense of other players, the simulation/game is principally non-zero sum in that most (if not all) of the players become better or worse off together.

5) Game. Monopoly is an example of a game. There are probably few learning outcomes, except for learning to play the game; the few learning outcomes are cognitive--such as understanding the role of a monopoly bank in a community. Roles are defined by how much money a player has. In the case of Monopoly, the group size is One-To-One. In the game, players deal with a single system; chance factors are high; there is no simulated time. Players just play the game; there is little negotiation, except for some property exchange. At the end of the game a winner is declared.

Use of the Framework

It should be made clear that the types of activities and characteristics as we have identified them are not mutually exclusive. However, we feel they are distinguishable enough so that a user or potential user of simulation-type activities can benefit from an examination of activities according to the characteristics listed.

As mentioned earlier, a teacher might use the framework to select a simulation-type activity most appropriate to her/his general teaching goals and situate it at a fitting point in the curriculum sequence. As an illustration, we might elaborate on the example used earlier of finding a simulation-type activity for use in a unit on poverty.

At first, the teacher's goal might be to expose students to the psychological and social milieu of poverty--to have them experience the concommitant feelings of powerlessness and hopelessness and of being on the losing end of social prejudices. As a learning situation, this calls for role-playing, with its predominant affective orientation, and for

roles that are qualitatively defined. A role-play, certain simulation exercises, or a simulation/game emphasizing role-playing would meet these requirements. The choice among these techniques might be made on the basis of grade level (young students might handle the single system role-play or simulation exercise better) or on the basis of the amount of time available (for every student to engage in a one-to-one role-play is time consuming).

Perhaps as a second step, the teacher wishes to have students deal with the economics of poverty, taking a much more quantitative approach to the topic. Thus, his/her choice of techniques would shift away from those involving role-playing to those involving strategy, i.e., games and simulation/games emphasizing strategy. Possibly the teacher has available a simulation/game emphasizing role-playing that also involves some strategic operations. This could be used as an intermediate technique, helping students shift from a purely affective to a mixed affective-cognitive focus on the problem of poverty. Or, if students had first engaged in a single-system activity (role-play or simulation exercise), a simulation/game would help broaden their perspectives to include several systems (as are realistically involved in the problem of poverty).

As seen in this example, the framework can help a teacher determine the structure of a particular technique and how that structure might contribute to (or detract from) teaching/learning goals in a curriculum sequence.

LIST OF CURRICULUM PACKAGES ANALYZED IN DETAIL

Elementary Economics Project, Industrial Relations Center, University of Chicago.

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